

## PATENT ABSTRACTS OF JAPAN

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### (54) STABILIZING AGENT FOR COAL IN STORAGE

#### (57)Abstract:

PROBLEM TO BE SOLVED: To obtain a stabilizing agent for coal in storage which has excellent effect on prevention of natural oxidation and coal dust spattering phenomena.

SOLUTION: This stabilizing agent for coal in storage consists of the following components A and B: (A) the component A consists of 100 pts.wt. polyoxyethylene-based nonionic surfactant, 3-30 pts.wt. sulfate- or carboxylate- type anionic surfactant and 10-100 pts.wt. bivalent-pentavalent polyol having  $\leq 500$  molecular weight; (B) polymer emulsion having -30°C to 30°C transition temperature.

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CLAIMS

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[Claim(s)]

[Claim 1] The storage stabilizing agent of the coal characterized by consisting of a following A component and a B component.

<A component> Polyoxyethylene system nonionic surface active agent The 100 weight sections A sulfonate mold or carboxylate mold anionic surface active agent 3 - 30 weight section With a molecular weight of 500 or less polyol of 2 - pentavalence 10 - 100 weight section <B component> Giant-molecule emulsion whose glass transition temperature is -30-30 degrees C [claim 2] The storage stabilizing agent of the coal according to claim 1 characterized by said polyoxyethylene system nonionic surface active agent being the compound shown by following general formula  $RO(CH_2CH_2O)_nH$  (R is an alkylphenyl radical which has the alkyl group of carbon numbers 8-22, or the alkyl group of carbon numbers 6-15 among a formula, and n expresses polymerization degree and is 3-20 on an average.).

[Claim 3] The storage stabilizing agent of coal according to claim 1 with which the giant-molecule emulsion said whose glass transition temperature is -30-30 degrees C is characterized by being a vinyl acetate system, ethylene / vinyl acetate system, acrylic, an acrylic / styrene system, styrene / butadiene system, and a vinylidene-chloride system.

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## DETAILED DESCRIPTION

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### [Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the storage stabilizing agent for preventing the coal dust dispersion generated at the time of the natural oxidation at the time of storing the powder-like mining object of coal, and handling.

[0002]

[Description of the Prior Art] In recent years, young coal, such as coal, subbituminous coal which was low especially until now as for utility value, and brown coal, is improved as cheap fuel sources according to reexamination of the power rates by the comparison with overseas cheap power rates, the fall inclination of the generating cost by an independent power producer's (IPP) entry, etc. However, since it is easy to oxidize, coal, especially these young coal are usually promptly used after arrival of goods. In being unable to use it promptly but storing, before internal temperature rises, it is necessary to deal with restacking, water spray, etc. of a coal crest, and there is a fault which leads to a cost rise. For this reason, the needs to the drugs for storing in stability are increasing.

[0003] on the other hand -- coal -- the transportation after mining, and a stock of coal -- it is usually ground by the magnitude of dozens of centimeters or less from the upper reason. under the present circumstances -- although about dozens of microns dust coal is also generated -- this dust coal -- the time of handling, and a stock of coal -- when a wind blows, it becomes coal dust, and disperses and there are also sometimes many problems, such as becoming aggravation of work environment and the generation source of a public nuisance.

[0004] About the scattering prevention by the wind of the deposit of a particulate matter, the proposal of various constituents is made by JP,52-11201,A, JP,57-98579,A, JP,59-51993,A, etc. as a coal dust inhibitor among coal dust prevention or scattering prevention. For example, although the coal dust tightness constituent which consists of with a polyoxyethylene system nonionic surface active agent, a sulfonate mold or a carboxylate mold anionic surface active agent, and a molecular weight of about 500 or less polyol of 2 - pentavalence is indicated by JP,57-98579,A, this approach has the inadequate operation effectiveness and there is a fault that it is necessary to sprinkle every about 2 hours, at the time of the high summer of especially atmospheric temperature, or a strong wind. Moreover, although the coal dust inhibitor which makes the water soluble polymer matter an active principle was indicated by JP,59-51993,A, it was inferior to film forming ability, and this coal dust inhibitor also had the low dust prevention effectiveness, and had the fault of not being not much effective.

[0005]

[Problem(s) to be Solved by the Invention] This invention aims at offering the storage stabilizing agent which does so the effectiveness excellent in natural oxidation prevention of coal, and coal dust dispersion prevention.

[0006]

[Means for Solving the Problem] As a result of examining wholeheartedly the drugs constituent which has effectiveness in natural oxidation prevention and coal dust dispersion prevention of coal, this invention persons used the specific nonionic surface active agent as the principal component, and completed a header and this invention for the target constituent being obtained by mixing the drugs which blended an anionic surface active agent and specific polyhydric alcohol, and the giant-molecule emulsion which has a specific glass transition temperature.

[0007] That is, according to this invention, the storage stabilizing agent of the coal characterized by consisting of a following A component and a B component is offered.

<A component> Polyoxyethylene system nonionic surface active agent The 100 weight sections A sulfonate mold or carboxylate mold anionic surface active agent 3 - 30 weight section With a molecular weight of 500 or less polyol of 2

- pentavalence 10 - 100 weight section <B component> According to the giant-molecule emulsion whose glass transition temperature is -30-30 degrees C, and this invention Said polyoxyethylene system nonionic surface active agent is following general formula  $RO(CH_2CH_2O)_nH$  (R is an alkylphenyl radical which has the alkyl group of carbon numbers 8-22, or the alkyl group of carbon numbers 6-15 among a formula, and n expresses polymerization degree and is 3-20 on an average.). The storage stabilizing agent of said coal characterized by being the compound shown is offered. Furthermore, according to this invention, the storage stabilizing agent of said coal with which the giant-molecule emulsion said whose glass transition temperature is -30-30 degrees C is characterized by being a vinyl acetate system, ethylene / vinyl acetate system, acrylic, an acrylic / styrene system, styrene / butadiene system, and a vinylidene-chloride system is offered.

[0008]

[Embodiment of the Invention] Hereafter, the storage stabilizing agent of the coal of this invention is further explained to a detail. As a polyoxyethylene system nonionic active agent component of A component of the constituent of this invention, the compound shown, for example by degree type  $RO(CH_2CH_2O)_nH$  (R is an alkylphenyl radical which has the alkyl group of carbon numbers 8-22 or the alkyl group of carbon numbers 6-15 among a formula, and n expresses polymerization degree and is 3-20 on an average.) is mentioned. The example of these suitable compounds The polyoxyethylene octyl ether (n=3-10), The polyoxyethylene DESHIRU ether (n=3.5-12), polyoxyethylene dodecylether (n=4-15), The polyoxyethylene octadecyl ether (n=5-18), a polyoxyethylene C12 - C15 synthetic-alcohol ether (n=4-15), Which polyoxyethylene alkyl ether, polyoxyethylene octyl phenyl ether (n=3-15), It is polyoxyethylene alkyl phenyl ether, such as the polyoxyethylene nonylphenyl ether (n=4-15) and polyoxyethylene dodecyl phenyl ether (n=5-18).

[0009] This polyoxyethylene system nonionic surface active agent is used in order to make it the coal which is mainly a processing object get wet in water promptly. Other nonionic active agents are [ the raising dust prevention effectiveness at the time of using together with other components ] insufficient even if there is wetting power.

[0010] Next, the sulfonate mold of A component of the constituent of this invention or a carboxylate mold anionic surface active agent component is used in the storage stabilizing agent of this invention as a component which mainly prevents the separation in the elevated temperature of this constituent. As a suitable example of such an anionic surface active agent The alpha-olefin sulfonate of a carbon number 8, the alpha-olefin sulfonate of a carbon number 12, Alpha-olefin sulfonate of the carbon numbers 8-18, such as alpha-olefin sulfonate of a carbon number 14, and alpha-olefin sulfonate of a carbon number 16; A nonyl benzene sulfonate, The dodecylbenzenesulfonic acid salt, a tridecyl benzenesulfonic acid salt, Alkylbenzene sulfonates with the alkyl group of the carbon numbers 8-16, such as a tetradecyl \*\* NZEN sulfonate; The Deccan sulfonate, They are fatty-acid salts, such as the alkane sulfonate of the carbon numbers 8-16, such as a dodecane sulfonate and a tetradecane sulfonate, and caprate, a lauric-acid salt, a myristic-acid salt, palmitate, oleate, a stearate, a beef tallow fatty-acid salt, and a palm-oil-fatty-acid salt. These are used as an alkali-metal salt or ammonium salt, such as sodium salt and potassium salt.

[0011] Since this anionic surface active agent has a bad influence on the raising dust prevention effectiveness, it is required that the amount used should be lessened as much as possible. as the range with which the operating rate of this anionic surface active agent is satisfied of both high temperature oxidation stability and the raising dust prevention effectiveness -- the polyoxyethylene system nonionic surface active agent component 100 weight section -- receiving -- 3 - 30 weight section -- it is 5 - 20 weight section preferably.

[0012] A component of the constituent of this invention makes the with a molecular weight of 500 or less polyol of 2 - pentavalence contain as the 3rd component further. This polyol is an indispensable component for acquiring the raising dust prevention effectiveness of having excelled with said polyoxyethylene system nonionic surface active agent. As for the example of suitable polyol, with an ordinary temperature liquid-like molecular weight of 500 or less 2 - trivalent polyol is mentioned by water solubility, such as ethylene glycol, propylene glycol, a glycerol, diglycerol, triglycerol, a diethylene glycol, triethylene glycol, a polyethylene glycol of molecular weight 200, a polyethylene glycol of molecular weight 300, and a polyethylene glycol of molecular weight 400. As for the operating rate of this polyol, the 10 - 100 weight section and the outstanding effectiveness are preferably acquired to said nonionic surface active agent component 100 weight section at the time of \*\*\*\* for 30 - 80 weight sections.

[0013] On the other hand, the giant-molecule emulsion whose glass transition temperature is -30-30 degrees C is used as a B component of the constituent of this invention. As this giant-molecule emulsion, the aquosity emulsion of high molecular compounds, such as a vinyl acetate system, ethylene / vinyl acetate system, acrylic systems (an acrylic acid or methacrylic acids, those ester, etc.), an acrylic / styrene system, styrene / butadiene system, and a vinylidene-

chloride system, is mentioned. Specifically, ethylene / vinyl acetate copolymer emulsion, butyl acrylate / methyl-methacrylate copolymer emulsion, an ethyl acrylate / styrene copolymer emulsion, a methyl acrylate / ethylene copolymer emulsion, an ethyl acrylate / vinyl acetate copolymer emulsion, etc. are mentioned. Among this, ethylene / vinyl acetate copolymer emulsion, and butyl acrylate / methyl-methacrylate copolymer emulsion are desirable in respect of the film forming ability to coal, or moisture maintenance ability.

[0014] Although the emulsion of the concentration of arbitration can be used since the giant-molecule emulsion of B component is used with the solution which used water etc. and was diluted in case it is applied to a coal lump, as a B component, the giant-molecule emulsion of 35 - 55% of the weight of concentration is used still more preferably 30 to 60% of the weight preferably.

[0015] Moreover, additives various in the range which does not check the effectiveness of this invention, for example, lower alcohol, a high DOROTO rope, the water soluble polymer matter, etc. can be added.

[0016] Although it is high concentration in order that A component and B component which are the storage stabilizing agent of the coal of this invention or its constituent may make storage and transportation easy, in application for coal, A component which is this constituent or its constituent, and B component are usually preferably used 0.01 to 1% of the weight by A component 10 or less % of the weight with the gestalt of the water solution contained about 0.01 to 1% of the weight also of B component.

[0017] The storage stabilizing agent of the coal of this invention is sprinkled by the coal stored in the coal yard. In this invention, by carrying out adjustment mixing at predetermined concentration, and sprinkling A component and B component for coal, high surface hardness and the thick coal film can be formed, and high effectiveness is acquired by natural oxidation prevention and raising dust prevention. When mixing A component and B component, 9 / 1 - 4/6 can mix and use the weight ratio of A component and B component preferably desirable especially in large range called 8 / 2 - 5/5.

[0018] Moreover, as the application approach to the coal of the constituent of this invention, cylindrical irrigation and spraying irrigation, spraying by the sprinkler, etc. are used. In this case, it is the location which coal oxidizes for a motion of air or vibration, and it is easy, and is easy to carry out raising dust, for example, desired effectiveness can be acquired for the weight ratio 9 of A component and B component / 0.05 - 5 % of the weight water solution of mixed constituents of 1 - 4/6 1m of processing-object coal crest front faces by [ of per two, and 1-10L ] sprinkling at a rate of 2-6L comparatively preferably.

[0019]

[Example] Hereafter, this invention is concretely explained based on an example.

[0020] A component of the storage stabilizing agent of the coal of examples 1-16, the example 1 of a comparison - 3 each example, and the example of a comparison selected one sort from the nonionic surface active agent, the anionic surface active agent, and polyol which were indicated to Table 1 respectively, and as shown in Table 2, it adjusted these active principles. Moreover, the vinyl acetate system and the acrylic emulsion which were used as a B component were shown in Table 3.

[0021]

[Table 1]

A成分の成分表

a-1	ポリオキシエチレンラウリルエーテル n=10
a-2	ポリオキシエチレンラウリルエーテル n=13
a-3	ポリオキシエチレンノニルフェニルエーテル n=7
a-4	ポリオキシエチレンノニルフェニルエーテル n=10
a-5	ポリオキシエチレンノニルフェニルエーテル n=13
a-6	ポリオキシエチレンC12-14 2級アルコールエーテル n=9
b-1	C12アルキルベンゼンスルホン酸ナトリウム
b-2	C14 $\alpha$ -オレフィンスルホン酸ナトリウム
c-1	グリセリン
c-2	ジグリセリン
c-3	プロピレングリコール

a-成分中のnはエチレンオキシサイドの付加モル数を示す。

[0022]

[Table 2]

A成分の組成表

番 号	a-成分		b-成分		c-成分	
	成分	配合量	成分	配合量	成分	配合量
A-1	a-1	40	b-1	5	c-1	35
A-2	a-2	50	b-1	5	c-1	25
A-3	a-3	45	b-1	5	c-1	30
A-4	a-3	45	b-1	5	c-2	30
A-5	a-4	45	b-2	5	c-1	30
A-6	a-5	45	b-1	5	c-2	20
A-7	a-6	45	b-2	5	c-3	30
A-8	a-3	20	b-1	20	c-1	50
A-9	a-3	50	b-1	1	c-1	20

a-成分、b-成分、c-成分をそれぞれ記載した重量部混合し、バランス量の水を加えて100重量部とする。

[0023]

[Table 3]

## B成分のエマルジョンの組成

B-1	エチレン/酢酸ビニル=15/85 分子量約10万のエチレン/ 酢酸ビニル系エマルジョン40重量%品 ガラス転移温度:-10℃
B-2	アクリル酸ブチル/メタクリル酸メチル=70/30 分子量約3 0万以上のアクリル系エマルジョン50重量%品 ガラス転移温度 :-22℃

[0024] The storage stabilizing agent of each example which adjusted the coal crest by the approach shown below, and mixed and adjusted A component and B component, and the example of a comparison was sprayed so that it might become 3 L/m<sup>2</sup> to a coal crest front face. In addition, the description of the coal with which the trial was presented is shown in Table 4. A sample crest is saved so that the rain after spraying may not be cost, it carries out the surface hardness measurement trial shown in the after [ two weeks ] following, and the thickness measurement trial of the hardened coal film, and shows the result in Table 5.

[0025] O the 400mm surface each 200 of bottom \*\*\*\* of creation of the sample crest of coal -- specified quantity spraying of dust scattering which produced and adjusted the coal crest of a mm height 200mm truncated four-sided pyramid, and the overtemperature protection agent sample is carried out, and it considers as the crest for a trial.

[0026] O The degree of hardness was measured in the four upper parts of a coal crest using a surface hardness measurement trial Yamanaka style soil hardness tester (Made in the Fujiwara Factory No.351) of a coal crest, and the average was made into surface hardness.

[0027] O The coal which solidified from the thickness measurement test sample crest of the hardened coal film is taken out, and the thickness of the coal film is measured using slide calipers. Measurement of four samples was performed and the average was made into thickness.

[0028]

[Table 4]

○使用した石炭の性状表

	太 平 洋 炭	ブレアソール炭
水分 (重量%)	5.5	8.0
灰分 (重量%)	5.0	6.0
揮発分 (重量%)	48.0	29.4
元素分析 (重量%)	C:77.8 H:6.0 O:14.9 N:1.1 S:0.2	C:78.7 H:6.9 O:12.4 N:1.3 S:0.7

[0029]

[Table 5]



試験結果

例	A 成分		B 成分		石炭種	表面硬度 (kg/cm <sup>2</sup> )	石炭膜 厚さ (mm)
	組成	配合量(重量%)	組成	配合量(重量%)			
実施例 1	A-1	0.6	B-1	0.2	太平洋炭	7.1	85
実施例 2	A-1	0.25	B-2	0.2	太平洋炭	5.6	50
実施例 3	A-2	0.25	B-1	0.2	太平洋炭	5.2	49
実施例 4	A-3	0.6	B-1	0.2	ブレアソール炭	7.8	95
実施例 5	A-3	0.25	B-2	0.2	ブレアソール炭	5.9	66
実施例 6	A-3	0.1	B-1	0.1	ブレアソール炭	3.9	35
実施例 7	A-4	0.5	B-1	0.2	ブレアソール炭	8.5	102
実施例 8	A-4	0.25	B-2	0.2	ブレアソール炭	5.7	61
実施例 9	A-4	0.1	B-1	0.1	ブレアソール炭	4.1	44
実施例 10	A-5	0.5	B-1	0.2	ブレアソール炭	6.8	75
実施例 11	A-6	0.5	B-1	0.2	ブレアソール炭	6.4	72
実施例 12	A-7	0.5	B-1	0.2	太平洋炭	8.7	98
実施例 13	A-3	0.26	B-2	0.2	太平洋炭	5.2	50
実施例 14	A-3	0.25	B-1	0.1	太平洋炭	3.9	42
実施例 15	A-8	0.25	B-1	0.2	ブレアソール炭	5.6	58
実施例 16	A-9	0.25	B-2	0.2	ブレアソール炭	5.2	54
比較例 1	A-3	0.25	—	0	ブレアソール炭	2.0	0
比較例 2	—	0	B-1	0.2	ブレアソール炭	1.5	0
比較例 3	A-3	0.25	—	0	太平洋炭	2.1	15

[0030] By the case where A component and B component are used independently respectively, the high surface hardness which is not obtained and the thick coal film were able to be obtained by spraying the constituent which mixed A component and B component on a coal crest so that clearly from the result of Table 5. While controlling the temperature up of a coal crest sharply and preventing natural oxidation by this, scattering of dust was able to be prevented effectively.

[0031]

[Effect of the Invention] It is high, membranous thickness can also thicken the surface hardness, natural oxidation prevention and the raising dust prevention effectiveness are excellent, and the storage stabilizing agent of the coal of this invention is very useful from the standpoint of a fuel cost cut, prevention of pollution, saving resources, energy saving, and disaster prevention, when it sprinkles on a coal crest.

[Translation done.]